Chapter- 3

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

QUESTION BANK

MCQ (AVERAGE LEVEL)

1. The pair of equations y = 0 and y = −7 has

   (a) one solution (b) two solution   (c) infinitely many solutions   (d) no solution

2. The pair of equations x = a and y = b graphically represents the lines which are

   (a) parallel   (b) intersecting at (a, b)

   (c) coincident   (d) intersecting at (b, a)

3. The value of c for which the pair of equations cx − y = 2 and 6x − 2y = 3 will have infinitely many solutions is

   (a) 3   (b) − 3   (c) − 12   (d) no value

4. When lines l$_1$ and l$_2$ are coincident, then the graphical solution system of linear equation have

   (a) infinite number of solutions   (b) unique solution

   (c) no solution   (d) one solution

5. When lines l$_1$ and l$_2$ are parallel, then the graphical solution system of linear equation have

   (a) infinite number of solutions   (b) unique solution

   (c) no solution   (d) one solution

6. The coordinates of the vertices of triangle formed between the lines and y-axis from the graph is

    (a) (0, 5), (0, 0) and (6.5,0)   (b) (4,2), (0, 0) and (6.5,0)

    (c) (4,2), (0, 0) and (0,5)   (d) none of these
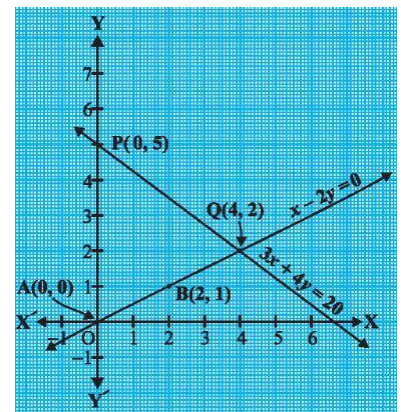
7. Five years ago Nuri was thrice old as Sonu. Ten years later, Nuri will be twice as old as Sonu. The present age, in years, of Nuri and Sonu are respectively

    (a) 50 and 20   (b) 60 and 30 (c) 70 and 40 (d) 40 and 10

8. The pair of equations $5x - 15y = 8$ and $3x - 9y = 24/5$ has

    (a) infinite number of solutions   (b) unique solution

    (c) no solution   (d) one solution

9. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have

    (a) infinite number of solutions   (b) unique solution

    (c) no solution   (d) one solution

10. The sum of the digits of a two digit number is 9. If 27 is added to it, the digits of the numbers get reversed. The number is

    (a) 36   (b) 72   (c) 63   (d) 25

11. If a pair of equation is consistent, then the lines will be

    (a) parallel   (b) always coincident

    (c) always intersecting   (d) intersecting or coincident

12. The solution of the equations x + y = 14 and x – y =4 is

   (a) x = 9 and y = 5   (b) x = 5 and y = 9   (c) x = 7 and y = 7   (d) x = 10 and y = 4

13. The sum of the numerator and denominator of a fraction is 12. If the denominator is increased by b3, the fraction becomes ½ , then the fraction

   (a) $\dfrac{4}{7}$ (b) $\dfrac{5}{7}$ (c) $\dfrac{6}{7}$ (d) $\dfrac{3}{7}$

14. The value of k for which the system of equations x – 2y = 3 and 3x + ky = 1 has a unique solution is

   (a) k = – 6   (b) k – 6   (c) k = 0   (d) no value

15. If a pair of equation is inconsistent, then the lines will be

   (a) parallel   (b) always coincident

   (c) always intersecting   (d) intersecting or coincident

16. The value of k for which the system of equations 2x + 3y = 5 and 4x + ky = 10 has infinite many solution is

   (a) k = – 3   (b) k – 3   (c) k = 0   (d) none of these

17. The value of k for which the system of equations kx – y = 2 and 6x – 2y = 3 has a unique solution is

   (a) k = – 3   (b) k – 3   (c) k = 0   (d) k 0

18. Sum of two numbers is 35 and their difference is 13, then the numbers are

(a) 24 and 12　　　　(b) 24 and 11　　　　(c) 12 and 11　　　　(d) none of these

19. The solution of the equations $0.4x + 0.3y = 1.7$ and $0.7x − 0.2y = 0.8$ is

(a) x = 1 and y = 2　　　(b) x = 2 and y = 3　　　(c) x = 3 and y = 4　　　(d) x = 5 and y = 4

20. The solution of the equations $x + 2y = 1.5$ and $2x + y = 1.5$ is

(a) x = 1 and y = 1 (b) x = 1.5 and y = 1.5 (c) x = 0.5 and y = 0.5 (d) none of these

21. The value of k for which the system of equations $x + 2y = 3$ and $5x + ky + 7 = 0$ has no solution is

(a) 10　　　　　(b) 6　　　　(c) 3　　(d) 1

22. The value of k for which the system of equations $3x + 5y = 0$ and $kx + 10y = 0$ has a non-zero solution is

(a) 0　　　　　(b) 2　　　　(c) 6　　(d) 8

23.

. Sum of two numbers is 50 and their difference is 10, then the numbers are

(a) 30 and 20　　　　　(b) 24 and 14　　　(c) 12 and 2　　　(d) none of these

24. The sum of the digits of a two-digit number is 12. The number obtained by interchanging its digit

exceeds the given number by 18, then the number is

(a) 72　　　　(b) 75　　　　(c) 57　　　　(d) none of these

25. The sum of a two-digit number and the number obtained by interchanging its digit is 99.
If the digits differ by 3, then the number is

(a) 36　　　　(b) 33　　　　(c) 66　　　　(d) none of these

26.
Seven times a two-digit number is equal to four times the number obtained by reversing the

order

of its digit. If the difference between the digits is 3, then the number is

   (a) 36   (b) 33   (c) 66   (d) none of these

27. A two-digit number is 4 more than 6 times the sum of its digits. If 18 is subtracted from the

   number, the digits are reversed, then the number is

   (a) 36   (b) 46   (c) 64   (d) none of these

28. The sum of two numbers is 1000 and the difference between their squares is 25600, then the numbers are

   (a) 616 and 384 (b) 628 and 372   (c) 564 and 436   (d) none of these

29. Five years ago, A was thrice as old as B and ten years later A shall be twice as old as B, then the present age of A is

   (a) 20   (b) 50   (c) 30   (d) none of these

30. The sum of thrice the first and the second is 142 and four times the first exceeds the second by

   138, then the numbers are

   (a) 40 and 20   (b) 40 and 22   (c) 12 and 22   (d) none of these

31..   The sum of twice the first and thrice the second is 92 and four times the first exceeds seven times the second by 2, then the numbers are

   (a) 25 and 20   (b) 25 and 14   (c) 14 and 22   (d) none of these

32.. The difference between two numbers is 14 and the difference between their squares is 448, then the numbers are

(a) 25 and 9   (b) 22 and 9   (c) 23 and 9   (d) none of these

WORD PROBLEMS

AVERAGE LEVEL

1. The sum of two numbers is 137 and their difference is 43. Find the numbers.

2. The sum of thrice the first and the second is 142 and four times the first exceeds the second by 138, then find the numbers.

3. Sum of two numbers is 50 and their difference is 10, then find the numbers.

4. The sum of twice the first and thrice the second is 92 and four times the first exceeds seven times the second by 2, then find the numbers.

5. The sum of two numbers is 1000 and the difference between their squares is 25600, then find the numbers.

6. The difference between two numbers is 14 and the difference between their squares is 448, then find the numbers.

7. The sum of two natural numbers is 8 and the sum of their reciprocals is $\dfrac{8}{15}$. Find the numbers.

TWO-DIGIT PROBLEMS(AVERAGE LEVEL)

1. The sum of the digits of a two digit number is 12. The number obtained by interchanging the two digits exceeds the given number by 18. Find the number.

2. Seven times a two-digit number is equal to four times the number obtained by reversing the order of its digit. If the difference between the digits is 3, then find the number.

3. The sum of the digits of a two digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

4. The sum of the digits of a two digit number is 9. If 27 is added to it, the digits of the numbers get reversed. Find the number.

5. The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?

6. A two-digit number is 4 more than 6 times the sum of its digit. If 18 is subtracted from the number, the digits are reversed. Find the number.

7. The sum of a two-digit number and the number obtained by reversing the digits is 99. If the digits differ by 3, find the number.

8. The sum of a two-digit number and the number formed by interchanging its digit is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of the digits of the original number. Find the original number.

9. A two-digit number is 3 more than 4 times the sum of its digit. If 18 is added to the number, the digits are reversed. Find the number.

10. The sum of the digits of a two digit number is 15. The number obtained by interchanging the two digits exceeds the given number by 9. Find the number.

II.   AGE RELATED QUESTIONS(MODERATE LEVEL)

1. Ten years hence, a man's age will be twice the age of his son. Ten years ago, man was four times as old as his son. Find their present ages.

2. A man's age is three times the sum of the ages of his two sons. After 5 years his age will be twice the sum of the ages of his two sons. Find the age of the man.

3. If twice the son's age in years is added to the mother's age, the sum is 70 years. But if twice the mother's age is added to the son's age, the sum is 95 years. Find the age of the mother and her son.

4. Five years ago Nuri was thrice old as Sonu. Ten years later, Nuri will be twice as old as Sonu. Find the present age of Nuri and Sonu.

5. The present age of a woman is 3 years more than three times the age of her daughter. Three years hence, the woman's age will be 10 years more than twice the age of her daughter. Find their present ages.

6. Two years ago, a man was 5 times as old as his son. Two years later his age will be 8 more than three times the age of the son. Find the present ages of the man and his son.

7. I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I and how old is my son?

8. A and B are friends and their ages differ by 2 years. A's father D is twice as old as A and B is twice as old as his sister C. The age of D and C differ by 40 years. Find the ages of A and B.

9. The ages of two friends Ani and Biju differ by 3 years. Ani's father Dharam is twice as old as Ani and Biju is twice as old as his sister Cathy. The ages of Cathy and Dharam differ by 30 years. Find the ages of Ani and Biju.

10. Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages?

11. A father is three times as old as his son. In 12 years time, he will be twice as old as his son. Find their present ages.

III.   SPEED, DISTANCE AND TIME RELATED QUESTIONS (MODERATE LEVEL)

1. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and that of the boat in still water.

2. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?

3. Points A and B are 90 km apart from each other on a highway. A car starts from A and another from B at the same time. If they go in the same direction they meet in 9 hours and if they go in

   opposite directions they meet in $\frac{9}{}$ hours. Find their speeds.

4. A train covered a certain distance at a uniform speed. If the train would have been 10 km/h faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/h; it would have taken 3 hours more than the scheduled time. Find the distance covered by the train.

5. Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

6.

Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

7. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and that of the boat in still water.

8. A man travels 370 km partly by train and partly by car. If he covers 250 km by train and the rest by car, it takes him 4 hours. But if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car.

9. A boat covers 32 km upstream and 36 km downstream in 7 hours. In 9 hours, it can cover 40 km upstream and 48 km down-stream. Find the speed of the stream and that of the boat in still water.

10. Two places A and B are 120 km apart on a highway. A car starts from A and another from B at the same time. If the cars move in the same direction at different speeds, they meet in 6 hours. If they travel towards each other, they meet in 1 hours 12 minutes. Find the speeds of the two cars.

IV.   GEOMETRICAL FIGURES RELATED QUESTIONS (MODERATE LEVEL)

1. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.

2. The length of a room exceeds its breadth by 3 metres. If the length is increased by 3 metres and the breadth is decreased by 2 metres, the area remains the same. Find the length and the breadth of the room.

3. The area of a rectangle gets reduced by $8m^2$, if its length is reduced by 5m and breadth is increased by 3m. If we increase the length by 3m and the breadth by 2m, the area increases by $74m^2$. Find the length and the breadth of the rectangle.

4. In a $\triangle$ABC, $\angle$C = 3 $\angle$B = 2($\angle$A + $\angle$B). Find the angles.

5. Find the four angles of a cyclic quadrilateral ABCD in which $\angle$A = $(2x - 1)^0$, $\angle$B = $(y + 5)^0$, $\angle$C = $(2y + 15)^0$ and $\angle$D = $(4x - 7)^0$.

6. The area of a rectangle remains the same if the length is increased by 7m and the breadth is decreased by 3m. The area remains unaffected if the length is decreased by 7m and the breadth is increased by 5m. Find the dimensions of the rectangle.

7. The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.

8. In a $\triangle$ABC, $\angle$A = x^0, $\angle$B = $(3x - 2)^0$, $\angle$C = y^0. Also, $\angle$C − $\angle$B = 9^0. Find the three angles.

9. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. Find the dimensions of the garden.

V.   TIME AND WORK RELATED QUESTIONS (MODERATE LEVEL)

1. 2 men and 7 boys can do a piece of work in 4 days. The same work is done in 3 days by 4 men and 4 boys. How long would it take one man and one boy to do it alone.

2. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.

3. 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys finish it in 14 days. Find the time taken by one man alone and by one boy alone to finish the work.

4. 8 men and 12 boys can finish a piece of work in 5 days while 6 men and 8 boys finish it in 7 days. Find the time taken by 1 man alone and by 1 boy alone to finish the work.

5. 2 men and 5 boys can do a piece of work in 4 days. The same work is done by 3 men and 6 boys in 3 days. . Find the time taken by 1 man alone and by 1 boy alone to finish the work.

VI.   HIGHER LEVEL

1. One says, "Give me a hundred, friend! I shall then become twice as rich as you". The other replies, "If you give me ten, I shall be six times as rich as you". Tell me what is the amount of their (respective) capital?

2. The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.

3. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been

deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?

4. A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay Rs 1000 as hostel charges whereas a student B, who takes food for 26 days, pays Rs 1180 as hostel charges. Find the fixed charges and the cost of food per day.

5. From a bus stand in Bangalore , if we buy 2 tickets to Malleswaram and 3 tickets to Yeshwanthpur, the total cost is Rs 46; but if we buy 3 tickets to Malleswaram and 5 tickets to Yeshwanthpur the total cost is Rs 74. Find the fares from the bus stand to Malleswaram, and to Yeshwanthpur.

6. The cost of 5 oranges and 3 apples is Rs 35 and the cost of 2 oranges and 4 apples is Rs 28. Find the cost of an orange and an apple.

7.A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid Rs 27 for a book kept for seven days, while Susy paid Rs 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day

8. Meena went to a bank to withdraw Rs 2000. She asked the cashier to give her Rs 50 and Rs 100 notes only. Meena got 25 notes in all. Find how many notes of Rs 50 and Rs 100 she received.

9. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save Rs 2000 per month, find their monthly incomes.

10. The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is Rs 105 and for a journey of 15 km, the charge paid is Rs 155. What are the fixed charges and the charge per km? How much does a person have to pay for travelling a distance of 25 km?

11. The coach of a cricket team buys 7 bats and 6 balls for Rs 3800. Later, she buys 3 bats and 5 balls for Rs 1750. Find the cost of each bat and each ball.

12. The cost of 2 pencils and 3 erasers is Rs 9 and the cost of 4 pencils and 6 erasers is Rs 18. Find the cost of each pencil and each eraser.

13. 5 pencils and 7 pens together cost Rs 50, whereas 7 pencils and 5 pens together cost Rs 46. Find the cost of one pencil and that of one pen.

14. The students of a class are made to stand in rows. If 4 students are extra in a row, there would be 2 rows less. If 4 students are less in a row, there would be 4 rows more. Find the number of students in the class.

MISCELLENOUS

1.If $ax + by = a^2 - b^2$ and $bx + ay = 0$, find the value of $(x + y)$ (AL)

2. For what value of k, the pair of equations $4x - 3y = 9$, $2x + ky = 11$ has no solution?(AL)

3. Calculate the area bounded by the line $x + y = 10$ and both the co-ordinate axes(ML)

4. Find whether the following pair of linear equations is consistent or inconsistent: (AL)
$3x + 2y = 8$ $6x - 4y = 9$

5. Check graphically whether the pair of equations $3x - 2y + 2 = 0$ and $32x - y + 3 = 0$, is)consistent. Also find the coordinates of the points where the graphs of the equations meet the Y-axis.(AL)

6. Draw the graph of
$2y = 4x - 6$; $2x = y + 3$ and determine whether this system of linear equations has a unique solution or not.(ML)

7. Solve for x and y:(ML)
$10/x+y + 2/x-y=4$; $15/x+y - 5/x-y=-2$
$x + y \neq 0$
$x - y \neq 0$

8. Solve the following pair of linear equations for x and y(ML)
$141x + 93y = 189$;
$93x + 141y = 45$

9. Solve for x and y: $x/a=y/b$;(HL)
$ax + by = a^2 + b^2$

10. Solve the following pair of equations: (ML)
$49x + 51y = 499$
$51x + 49 y = 501$

11. Find the value of a and p for which the following pair of linear equations has infinite number of solutions(ML)

2x + 3y = 7;

αx + (α + β)y = 28

12. The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in city comprises of fixed charges together with the charge for the distance covered. For a journey of 13 km, the charge paid is ₹129 and for a journey of 22 km, the charge paid is ₹210.(AL)

What will a person have to pay for travelling a distance of 32 km?

13. Draw the graphs of following equations:

2x – y = 1; x + 2y = 13 (ML)

Find the solution of the equations from the graph and shade the triangular region formed by the lines and the y-axis.

14. Draw the graphs of the equations x – y + 1 = 0 and 3x + 2y – 12 = 0. Determine the coordinates of the vertices of the triangle formed by these lines and x-axis.(ML)

15. 7x – 5y – 4 = 0 is given. Write another linear equation, so that the lines represented by the pair are(HL)

(i) intersecting

(ii) coincident

(iii) parallel

16. Solve the following pair of linear equations graphically:

x + 3y = 6 ; 2x – 3y = 12(AL)

Also find the area of the triangle formed by the lines representing the given equations with y-axis

17. A boat takes 4 hours to go 44 km downstream and it can go 20 km upstream in the same time. Find the speed of the stream and that of the boat in still water. (ML)

18. Sita Devi wants to make a rectangular pond on the road side for the purpose of providing drinking water for street animals. The area of the pond will be decreased by 3 square feet if its length is decreased by 2 ft. and breadth is increased by 1 ft. Its area will be increased by 4 square feet if the length is increased by 1 ft. and breadth remains same. Find the dimensions of the pond.(HL)

*** AL= AVERAGE LEVEL , ML= MODERATE LEVEL, HL = HIGHER LEVEL